## What is claimed:

1. A method of using silyl chemistry to control the reactivity of a selfassembled molecular electro-optic material, said method comprising:

providing an electro-optic material comprising a silyl-derivatized chromophore;

desilylating said chromophore to generate terminal hydroxy functionalities; and

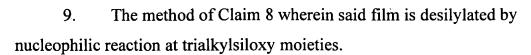
reacting said hydroxy functionalities with a reagent having at least one silicon moiety.

- 2. The method of Claim 1 wherein said chromophore is a high- $\beta$  chromophore.
- 3. The method of Claim 1 wherein said chromophore is derivatized with a trialkylsilyl protecting group.
- 4. The method of Claim 3 wherein said chromophore is derivatized with a *tert*-butyldimethylsilyl protecting group.
- 5. The method of Claim 1 wherein said chromophore is desilylated by treatment with a deprotecting agent.
- 6. The method of Claim 1 wherein said chromophore is derivatized with a *tert*-butyldimethylsilyl protecting group.
- The method of Claim 6 wherein said chromophore compound is desilylated with a quaternary ammonium fluoride.
- 8. A method of using silyl chemistry to generate a hydrophilic surface for molecular self-assembly of an electro-optic material, said method comprising:

providing an electro-optic material comprising a high-β chromophore film with terminal trialkylsiloxy moieties;

desilylating said film to generate terminal hydroxy functional groups; and

reacting said terminal hydroxy functional groups with a siloxane capping agent.



- 10. The method of Claim 8 wherein said film has terminal *tert*-butyldimethylsiloxy moieties.
- 11. The method of Claim 10 wherein said film is desilylated with tetran-butylammonium fluoride.
- 12. A method for assembling a multi-layered electro-optic siloxane film, said method comprising:

providing a substrate with a hydroxylated surface;

coupling a chromophore layer to said surface, said layer comprising a plurality of chromophore molecules, each said molecule reactive with said surface and having a terminal trialkylsiloxy moiety;

desilylating said chromophore layer to generate terminal hydroxy functionalities; and

coupling said chromophore layer with a capping layer, said capping layer comprising molecular components and each said component having at least two silicon moieties, said coupling providing a siloxane bond sequence between said chromophore and capping layers.

- 13. The method of Claim 12 wherein said chromophore molecule is a high-β chromophore.
- 14. The method of Claim 13 wherein each said high- $\beta$  chromophore has a terminal *tert*-butyldimethylsiloxy moiety.
- 15. The method of Claim 12 wherein said chromophore is desilylated by reaction of a nucleophile with said trialkylsiloxy moiety.
- 16. The method of Claim 15 wherein each said high- $\beta$  chromophore has a terminal *tert*-butyldimethylsiloxy moiety.
- 17. The method of Claim 16 wherein said chromophore is desilylated with tetra-*n*-butylammonium fluoride.

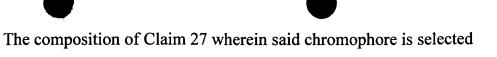
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- 18. The method of Claim 12 wherein said capping layer comprises octachlorotrisiloxane.
- 19. The method of Claim 18 wherein a second chromophore layer is coupled to said capping layer, said second chromophore layer comprising a plurality of chromophore molecules, each said chromophore molecule reactive with said capping layer and having a terminal trialkylsiloxy moiety.
- 20. The method of Claim 18 wherein said second coupled chromophore layer is desilylated then coupled with a second capping layer.
- 21. A non-linear optical material comprising a plurality of molecular bilayers, each said bilayer comprising a first chromophore molecular layer coupled to a capping molecular layer with a siloxane bond sequence, said capping molecular layer capable of coupling to another chromophore molecular layer with a siloxane bond sequence.
- 22. The material of Claim 21 wherein said chromophore is a high- $\beta$  chromophore.
- 23. The material of Claim 21 wherein said capping layer is a polysiloxane.
- 24. The material of Claim 23 wherein said capping layer comprises octachlorosiloxane.
- 25. The material of Claim 21 wherein said bilayers are deposited on a substrate.
- 26. The material of Claim 25 wherein said substrate and said bilayers are incorporated into a waveguide device.
- 27. A chromophore composition with non-linear optical properties having the structural formula (Ch)XR<sub>n</sub>, wherein (Ch)X is a chromophore substructure and X is a heteroatom; R is a trialkylsiloxyalkyl moiety; and n is the number of said moieties meeting the valence requirement of said heteroatom.

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29. The composition of Claim 27 where in X is selected from the group of heteroatoms consisting of O and N.

from the group consisting of structural formulae shown in FIGS. 2,11 and 15.

- 30. The composition of Claim 29 wherein X is N and n is 2.
- 31. The composition of Claim 27 comprising a non-linear optical film.

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